

S00025538
SUPERFUND RECORDS

WORK PLAN
SITE-WIDE WATER SUPPLY INVENTORY
CHEROKEE COUNTY SITE
102-7L37/W68540
March 6, 1987



March 6, 1987

W68543.WP

Ms. Alice Fuerst
U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Fuerst:

Enclosed for your review and approval is the Final Water Supply Inventory Work Plan for the Cherokee County site. A summary of the cost estimates for this activity are included in the work plan, and the official costs on an Optional Form 60 will be forwarded to you under separate copy from our Reston office. There may be some minor differences in the estimated total cost on these two forms because they are run on different computer systems. The budget approved by EPA should match the OF60.

This work plan represents one of several work plans Region VII has requested, as we develop final plans for several Remedial Investigation (RI) programs and three Operable Unit Feasibility Studies. Since the site is divided into six subsites and our various programs are either subsite specific or for the whole site, several work plans are more appropriate than one big, very complex plan.

Ms. Alice Fuerst
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If you have any questions please call. The Final Work Plan for the Sitewide Surface Hydrology Program (High Flow Conditions) will follow within a few days, and the Draft Work Plan for the Groundwater OUFS at Galena will be ready in about 10 days.

Sincerely,



Richard Moos, Ph.D.
SM Cherokee County Site

DE/CC4/060/nkm
Enclosure

cc: Randall Kaltreider, REM-DPO/EPA HDQS
J. Vince Gonzales, CO/EPA HDQS
Gale Wright/EPA, Kansas City
Bob Ogg, APM-OPNS/CH2M HILL, WDC
Wayne Sellman, APM-ADMIN/CH2M HILL, WDC
Mike Thompson, RM/CH2M HILL, KCK
Bill Bluck, RTL/CH2M HILL, DEN
Jim Ackerman/SRW Associates, Pittsburgh
Vicki Kohonoski/CH2M HILL, WDC

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I. INTRODUCTION

1.0 WORK PLAN

This work plan was prepared to partially fulfill the contractor requirements of the U. S. Environmental Protection Agency (EPA) for remedial response activities at uncontrolled hazardous waste sites. The work specified in the Work Plan will be performed under EPA Work Assignment No. 102-7L37. Previous Remedial Investigation (RI) work at the site was performed under REM/FIT Work Assignment No. 127.7LB9.0. SRW Associates Inc., a Division of ICF Technology, will conduct the well survey, sampling, and report preparation under CH2M Hill direction.

The initial remedial investigation activities at the Cherokee County site (Phase I RI) were focused by EPA on the Galena subsite. During the Phase I RI, a water supply inventory was performed at the Galena subsite. While the majority of the people within the subsite were obtaining their drinking water from the municipal system, about 235 people living outside the municipal water service area, but within the subsite, were using shallow private wells. Shallow wells are defined here as those set in the Boone aquifer and deep wells are defined as those set in the deeper confined aquifer, sometimes referred to as the Roubidoux Aquifer. The shallow wells were potentially subject to contamination from abandoned mines and mining wastes. Representative private wells were sampled in 1985 and the samples analyzed for metals. Results indicated instances where the primary drinking water standard was exceeded for cadmium, and the secondary drinking water standards were exceeded for iron, manganese and zinc (refer to the Phase I Remedial Investigation Report, April 23, 1986). These findings motivated sampling of all shallow private wells within the Galena subsite during 1986, and the subsequent installation of water treatment units by EPA on a few wells where applicable.

This Work Plan defines the activities for conducting water supply inventories and for performing well sampling in the Waco, Lawton, Badger, Baxter Springs, and Treece subsites. The water supply survey areas will include all of the area within each subsite, as it is presently defined, plus some additional areas immediately adjacent to the subsites. These survey area boundaries are defined in this Work Plan. They are different than the original subsite boundaries in that areas just outside the subsite that are immediately adjacent or downgradient from known underground mining areas are included. In addition to surveying the above five subsites, a limited inventory of two other areas will be performed where the existing data suggest the possibility of contaminated shallow groundwater. A preliminary estimate of the number of shallow wells expected to be inventoried has been developed. The field team leader will keep the SM and RPM advised as the door-to-door surveys are completed to determine if the well sampling task in this Work Plan was properly defined. Revisions to the sampling plan will be made, if necessary, with the approval of the RPM. Also included in this Work Plan will be the sampling of municipal and private deep wells drawing water from the Roubidoux Aquifer.

2.0 OBJECTIVE

The primary objective of this water supply inventory is to estimate the site population utilizing shallow groundwater that may be contaminated. This will be accomplished by attempting to locate the shallow private wells used for potable domestic purposes which are situated near areas that have been mined. The areas within and immediately adjacent to the currently defined subsites are considered the first priority areas and

will be surveyed more intensively than the second priority areas. The two second priority areas are the community of Lowell, south of Empire Lake, and the area just west of the Galena subsite. The following is a summary of specific work plan objectives:

- o Estimate the site population utilizing shallow groundwater that may be contaminated.
- o Obtain water quality and well construction data on most of the private wells within the first priority areas, and on about 25% of the private wells in the second priority areas.
- o Obtain water quality and well construction data on the deep municipal and industrial wells in the site area.

The information obtained as a result of this work will ultimately form the data base for a series of Operable Unit Feasibility Studies (OUFS's): principally, a site-wide OUFS on groundwater and a Galena subsite OUFS on groundwater.

3.0 ASSUMPTIONS

This RI Work Plan is based on the following assumptions:

- o Most or all of the private residents in areas not serviced by public water supply systems obtain their water from private wells developed in the shallow aquifer.
- o The door-to-door survey will be done by the sampling team or by a surveyor several days in advance of the sampling team. The team will keep the SM and RPM advised of any potential need to revise the sampling program as the survey progresses.

- o Sampling, field measurements, and sample documentation will be performed according to the project QAPP/SOP and this Work Plan.
- o Field work will be performed under a project specific Site Safety Plan with field activities restricted to public access roads and highways, private residences, and industrial facilities.
- o All of the deep (Roubidoux) wells can be sampled using existing in-place pumps, and the well owners will purge the wells immediately prior to sampling.
- o Homeowners consent with requests to sample their wells.
- o Survey and well sampling cost estimates are based largely on the number of dwellings indicated on 1978 USGS maps, which may not accurately reflect the current number of dwellings in the survey area.
- o All laboratory testing will be performed by the EPA Contract Laboratories Program (CLP) or other EPA Laboratories. No budget has been included for laboratory testing.
- o A Special Analytical Services (SAS) contract may be set up for laboratory testing, but the cost estimate assumes that a single laboratory will perform both the metals and water quality parameter testing.

II. THE SURVEY AREAS

1.0 WATER SUPPLY BACKGROUND

In October, 1986, some initial information was assembled on public/municipal drinking water resources within the entire Cherokee County site area. The objective of that work was to characterize the availability of public water supplies and obtain data on system capacity, water quality, and deep well construction, where available. All of the municipal water supply systems and rural water districts within the Cherokee County Site rely on deep wells (The Roubidoux Aquifer) for their water. The only exception identified was at Baxter Springs, where Spring River water is routinely used to supplement their deep wells. It was found that the service areas of seven different water supply districts cover most of the Cherokee County site area. Figure 1 depicts the service areas of these water supply districts, and they are referred to in the Work Plan as follows:

- o Rural Water District No. 1 (RWD-1)
- o Rural Water District No. 2 (RWD-2)
- o Rural Water District No. 3 (RWD-3)
- o Rural Water District No. 7 (RWD-7)
- o Baxter Springs Area Water District
- o Riverton Area Water District
- o Galena Municipal Water District

Within any one of the water supply districts, not all of the dwellings are necessarily connected to, and using, the public water supply system. Information obtained from the various district representatives suggests that the great majority of residents within a district utilize the service, and perhaps all the residents within towns and cities are

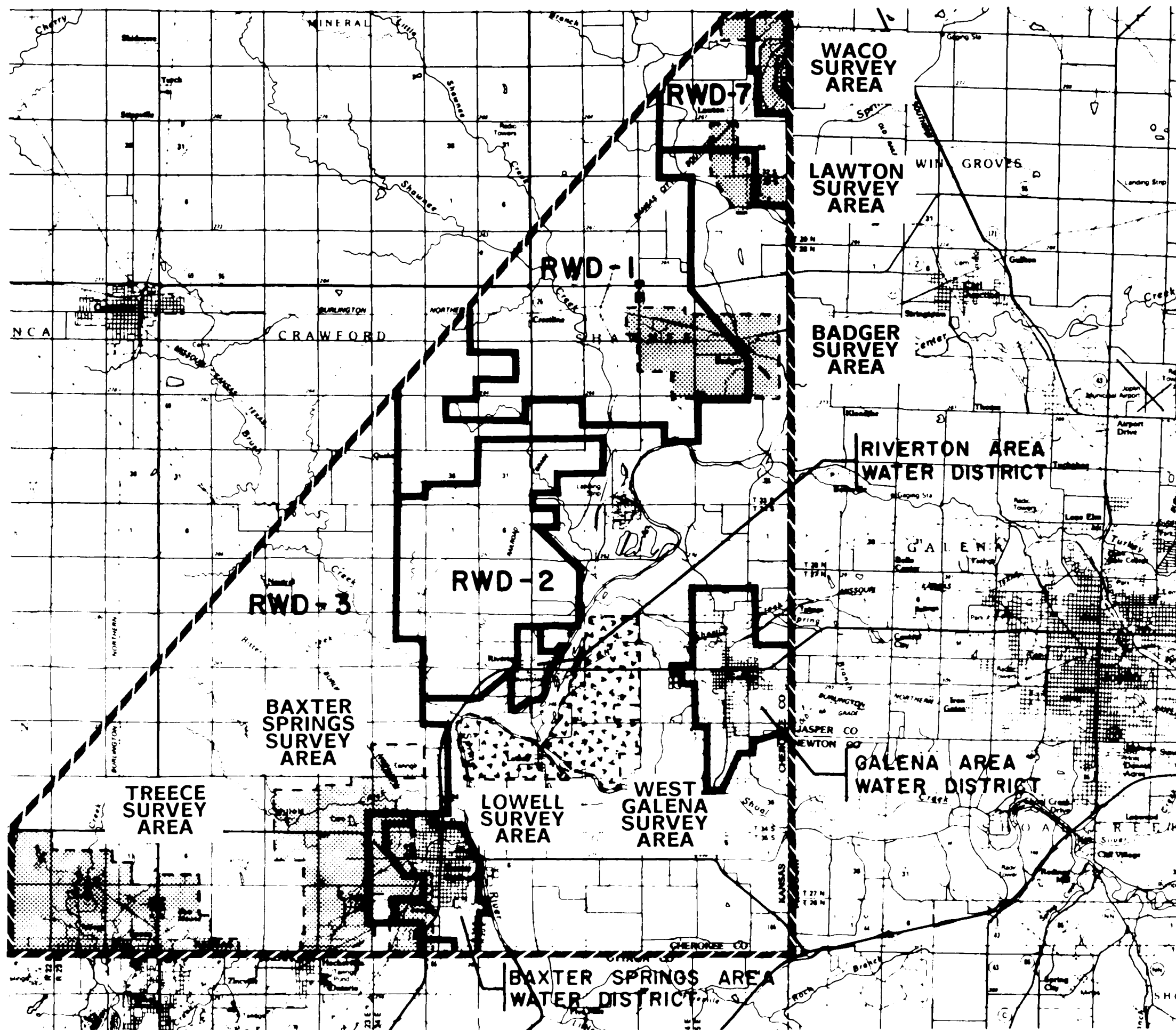


FIGURE 1
WATER SUPPLY INVENTORY
SURVEY AREAS
CHEROKEE CO. SITE

connected. However, there is no existing data base that conclusively identifies the population utilizing their own private water supplies within the various water districts. In addition, a map of water supply pipeline locations, obtained from a local consulting engineer, suggests localized areas within water districts where supply pipes may not reach all of the dwellings. There is also an indication that some residences that are connected to public water supplies also use private wells as a supplemental water source.

Some portions of the Waco, Lawton, Badger and Baxter Springs subsite areas are located outside public water service areas. The Treece subsite is completely covered by a water supply district. The major population areas lacking public water service were found to be the southeast corner of the site including the town of Lowell, the area west of the Galena subsite, and a block of land along the western boundary of Baxter Springs. Less populated areas lacking public water service include an area north of Galena and an area between RWD-2 and RWD-1 (Figure 1).

The Galena subsite is not included in the inventory subtasks of this Work Plan because it was inventoried in 1985. Most of the potable use private wells developed in the shallow aquifer within this subsite were sampled in 1985 and/or 1986. The results of the 1985 and 1986 sampling programs at Galena are presented in the Phase I RI Report for the Galena subsite or are in EPA files. The municipal wells at Galena and other deep wells in the subsite will, however, be part of this inventory and sampling program.

The principal criteria adopted for the selection of survey areas is the proximity to known mined areas. The assumption is that private wells at greatest risk of contamination are those closest to the mined areas.

2.0 FIRST PRIORITY SURVEY AREAS

First priority areas are those located close to known mined areas, regardless of whether or not they are within a public water supply district. Mined areas are defined for the purposes of this Work Plan as the underground mines and shafts mapped by McCauley, 1983 (Plates I-A, I-B, and I-C). Clusters of mine shafts are treated as mined areas.

The original subsite boundaries were drawn based on the major surface effects of mining, as mapped by McCauley, 1983 (Plates III-A, III-B and III-C). Since the subsite boundaries encompass most of the mined areas, the existing subsite areas are included within the first priority water supply survey areas. Based on the referenced mining maps, however, the following modifications have been made to the subsite areas to produce the first priority survey areas (refer also to Figure 1):

- o Waco Subsite Survey Area - A small mining area is located west of the subsite's north end, and is within the RWD-7 service area. The survey area will include this small area.
- o Lawton Subsite Survey Area - The eastern boundary of the Lawton Subsite (south half) will be extended 1/2 mile east to the state line.
- o Badger Subsite Survey Area - Subsite boundaries will be expanded to include dwellings near mine shafts at the southeast corner, and the northern middle sections of the subsite.
- o Baxter Springs Survey Area - Subsite boundaries will be expanded to the west about 1/4 mile to include dwellings within about one-quarter mile of mining. The southeastern corner of the subsite (near Baxter Junction) has been extended south 1/2 mile to include a small mined area.

- o Treece Subsite Survey Area - Subsite boundaries will be extended to the north and east to include dwellings within about one-quarter mile of mining. Mined areas immediately to the west of the Treece subsite will also be included, although this area in Melrose Quadrangle is not included in McCauley's mine mapping. In addition, an isolated mining area near Blue Mound Church will be included in the Treece survey area.

Table 1 provides a summary of private well estimates for the Work Plan, and includes the estimated number of dwellings to be canvassed. Estimates of the number of dwellings to be canvassed within first priority survey areas were made by assuming that 75% of the dwellings within public water districts, and 100% of the dwellings outside the public water districts will be contacted. The assumption of only 75% contact within public water districts is based on the probability that individual private water supplies in certain neighborhoods will be well known by most of the local residents, and contact with every dwelling will not be necessary to obtain reliable private water supply and well location information.

The dwellings were counted from USGS topographic maps (photo revised 1978), USDA black and white photos (1 inch = 2,000 feet, 1978), and partial coverage EPA color photographs (Aerial Photographic Analysis of the Tar Creek Hazardous Waste Site, 1983, 1 inch = 1,000 feet).

3.0 SECOND PRIORITY SURVEY AREAS

The two second priority areas are not located in or immediately adjacent to mined areas, but are relatively populated areas without public water service that have the potential for degraded groundwater quality based on the existing data. The two second priority areas are:

- o Area West of Galena - A total of 72 private wells within the Galena subsite were sampled during 1985 and 1986. About 15% of these

TABLE 1

Cherokee County Site
Summary of Private Well Estimates
Site-Wide Water Supply Inventory Work Plan

<u>Survey Area</u>	<u>Estimated Number of Dwellings(1)</u>	<u>Number of Dwellings to be Canvassed(1)</u>	<u>Estimated Potable Private Wells (2)(3)</u>
(First Priority Areas)			
Waco	8	8	2
Lawton	11	11	3
Badger	24	19	4
Baxter Springs	>70	63	12
Treece	55	45	6
(Second Priority Areas)			
West of Galena	170	43	32
Lowell	<u>90</u>	<u>23</u>	<u>17</u>
Total	>428	212	76

(1) Includes industrial facilities

(2) Basis for First Priority Area: All dwellings outside water district plus 10% of dwelling inside water district.

(3) Basis for Second Priority Area: 75% of the dwellings canvassed will own private wells (25% will not own wells).

exceeded drinking water MCLs. Many of these wells are located in areas just downgradient of mined areas, based on the shallow aquifer gradient map developed for the Phase I RI. This map suggests that the shallow groundwater in the Galena subsite area could flow to areas west of the subsite. The existence of contaminated wells near the borders of the Galena subsite combined with the suspected westward flow direction for the shallow aquifer is justification for the inventory of private wells in this area. The survey area west of Galena will include the block of land between the Galena Subsite and the Spring River (Figure 1).

- o Lowell Area - The Lowell area is significant because it has a concentrated population that is apparently entirely dependent on private wells for water. Some dwellings in this area, particularly at the north end of Lowell and the outlying areas to the west, may have wells screened in the flood plain sediments and former channels of Shoal Creek and Spring River. Since these sediments are potential transport mechanisms for mine drainage and may contain sediments derived from mined lands, sampling the wells in this area is justified. The groundwater hydrology has not been defined for these areas, but it is possible that private shallow wells in this area are downgradient from mined areas.

The canvassing effort will be less intensive for second priority areas, and will be designed to locate about 25% of the private wells. This limited survey and sampling is designed to provide an indication of groundwater quality in the second priority areas, an approach similar to the Galena Subsite Phase I RI private well sampling in 1985. If the sampling results suggest mining contaminated groundwater in these areas, additional investigations may be recommended to EPA.

Estimates of the number of dwellings to be canvassed in the second priority areas were made by assuming that 25% of existing dwellings will be canvassed. Dwellings were counted from USGS 7.5' quadrangle maps, with no reference to aerial photos.

III. SCOPE OF WORK

The scope of work for the site-wide water supply inventory is organized into three tasks: field work, technical memorandum, and project management. Each task has been defined to the extent existing information allows.

TASK 1.0 - FIELD WORK - CANVASSING AND WELL SAMPLING

This task includes all work related to performing the field canvassing and well sampling. The task is divided into the following subtasks: field preparation, canvassing first priority areas, canvassing second priority areas, sampling shallow wells, and sampling deep wells.

SUBTASK 1.1 - FIELD PREPARATION

Field maps for the inventory work will be prepared at a scale of 1 inch = 2,000 feet, reproduced from the latest photorevision of the USGS 7.5 minute quadrangles for the entire Cherokee County site. These field maps will be the primary source for locating existing dwellings, and will be revised as field observations dictate. A field map will be prepared for each survey team. The following information will be plotted on the field maps prior to starting the field inventory:

- o Modified subsite boundaries (first priority survey areas).
- o Second priority survey areas.
- o Water supply district boundaries within the survey areas.
- o Known municipal and industrial well locations (Source: KDHE and KGS).

- o Locations of any dwellings within survey areas that are shown on the 1983 aerial photography coverage, but not shown on the quadrangle maps.

This task will include coordination with the EPA to arrange for analytical services under the Contract Laboratory Program (CLP).

In addition, this task will include assembling additional information on the existing public water systems. This information is needed to perform the preliminary assessment of water system expansion discussed in Task 2.0, and for future evaluation of remedial responses. Kansas State agencies, municipal water departments, and RWD managers may be contacted for the following types of information: well capacity, pump station locations, water pipeline locations, water quality data, and other factors limiting system expansion.

Subtask 1.2 - CANVASSING FIRST PRIORITY AREAS

The first priority survey areas are shown on Figure 1. The goal of the field canvassing effort for first priority areas will be to locate and inventory 90 to 100% of the shallow domestic wells. All of the dwellings will be canvassed in the first priority survey areas lying outside the water supply district areas. Industrial use wells will also be inventoried to determine what potable uses they may have.

For areas lying within first priority survey areas and within water supply districts, not all dwellings will need to be canvassed. Although the goal is to locate 90 to 100% of the wells in these areas, the approach here will be to begin canvassing and rely on information obtained by residents to help direct the surveyor and to help locate the private wells. For example, in a neighborhood of 4 or 5 dwellings, one resident may provide the surveyor with assurance that the whole group of homes are connected to a RWD water line, but the farm one-quarter mile away does have a well.

The assumption for this Work Plan is that this approach will require contact with 75% of the private dwellings (or industrial buildings) within these areas. Table 1 summarizes the number of dwellings estimated for canvassing based on the described canvassing approach, and estimated total dwellings. Table 1 also includes an estimate of the number of wells expected to be located. This is included as the basis for estimating how many wells will be sampled (Task 1.4).

A water supply pipeline map will be used where possible to locate dwellings that are apparently isolated from the nearest water lines, and this will help to locate houses that may have wells.

Water Supply Inventory Forms (Attachment A) will be used for all contacts made during canvassing. For a dwelling, municipality, or industry using a private well, the inventory form will be completed even if the well is only a secondary water supply. An inventory form will also be completed for any surface water and spring users. For dwellings and industrial facilities canvassed and found to use public water supplies exclusively, only the name, address, and location will be completed on the inventory form, along with a notation of which public supply they use.

If the specific dwellings cannot be canvassed because no one is home after repeated visits, access is restricted, and neighbors cannot provide information, the RWD Manager or Utility Department Manager may be contacted for information, if the available field time allows.

Well drilling firms in the area will be contacted to inquire about the locations of both existing and abandoned wells, and obtain general information on aquifer water quality, if available.

1.2.1 - Waco Subsite Inventory

All dwellings in the Waco survey area will be canvassed (Figure 1). The Waco subsite is not serviced by a public water district and the aerial photography and USGS maps indicate only one dwelling located within the original subsite area. The survey area includes an estimated five (5) dwellings that are located around the perimeter of the subsite within Sections 24 and 25 of T32S, R25E. An isolated mine is located west of the north end of the subsite and two (2) dwellings are located nearby. The Waco survey area will include the dwellings in the northeast corner of Section 23, T32S, R25E. A visual survey of the area immediately north of the Waco subsite (Section 13) will determine the presence of any dwellings or obvious mining related features in this area. This area is located in the Kirkwood Quadrangle and was not included in McCauley's mapping. A visual survey will be performed from public roads to locate and inventory any additional dwellings.

Estimated Number of Dwellings: 8

Number to be Canvassed: 8

1.2.2 - Lawton Subsite Inventory

The lower two-thirds of the Lawton survey area appears to be unpopulated agricultural land which is not serviced by a public water system. The two (2) dwellings at the eastern border of this area (north one-half of Section 1, T33S, R25E) will be canvassed. The community of Lawton is located on the north border of the subsite in the RWD-7 service area, and about one-half mile north of the nearest mined area. The eight (8) dwellings estimated to be located on the south side of Lawton (within Section 35, T32S, R25E) will be canvassed. A small cluster of buildings apparently located within RWD-7 located about one-quarter mile south of the community of Lawton (estimated one dwelling) will also be canvassed.

A visual survey will be performed from the roads passing through the subsite to determine if any additional dwellings should be canvassed.

Estimated Number of Dwellings: 11

Number to be Canvassed: 11

1.2.3 - Badger Subsite Inventory

The western two-thirds of the Badger survey area, that section lying west of Spring River, is located within the RWD-1 service area. This area encompasses an estimated twenty-two (22) dwellings. The survey area lying east of Spring River has no public water service and is mostly unpopulated. The two dwellings apparently located on the eastern survey area boundary (in Section 24, T33S, R25E) will be canvassed. A visual survey will be performed from the public roadways to determine the existence of any additional dwellings.

Estimated Number of Dwellings: 24

Number to be Canvassed: 19

1.2.4 - Baxter Springs Subsite Inventory

About three-quarters of the Baxter Springs survey area is located within the RWD-3 service area. Approximately thirty (30) dwellings are located within this area. These dwellings will be canvassed to confirm if they use public water supplies.

The eastern edge of the subsite appears to be within the City of Baxter Springs water service area. This eastern edge area encompasses some built-up residential and industrial areas of Baxter Springs, so the survey approach here will be modified. Canvassing will be directed at locating the exact western limit of the Baxter Springs Water District, and any

private well users along this boundary will be inventoried. It is estimated that thirty (30) dwellings will be canvassed to accomplish this.

A one square-mile portion of the Baxter Springs survey area lies between the RWD-3 and City of Baxter Springs Water District. An estimated five (5) dwellings are located in this area. Every dwelling located in this area will be canvassed because it is in an area of known mining.

At least one industrial use well is known to exist in this survey area (SW quarter of Section 10, T35S, R24E). An attempt will be made to canvass all industrial facilities, estimated at five (5), within the Baxter Springs survey area to determine any potable use wells. A visual survey will be made from public roads to locate any additional dwellings or industrial facilities not indicated on the field maps.

Estimated Number of Dwellings (Including Industrial):	>70
Number to be Canvassed:	63

1.2.5 - Treece Subsite Inventory

The Treece subsite is completely covered by RWD-3 water service. No private domestic wells exist within the Town of Treece according to Treece Mayor Fred McCoy (316-679-9832). Therefore, canvassing will not be done within the town. An estimated forty (40) dwellings are located within the survey area outside of Treece. Six (6) industrial use wells are known to have been drilled since 1984 (KDHE). These six wells will be inventoried, and any potable uses will be recorded. It is estimated that an additional six industrial facilities might be canvassed in the Treece survey area. Any residential dwellings and industrial facilities not indicated on the field maps will be located by visual survey from public roads and will be included in the canvassing. In particular, the area west of the Baxter

Springs quadrangle will be surveyed for obvious mining features. This area was not included in the McCauley mine mapping. The field team leader will consult with the SM by telephone, after the visual survey, to determine if this area should be canvassed.

An isolated mine located near Blue Mound Church will be included in the Treece survey area. The mine is located in the NE quarter of Section 6, T35S, R24E. Three (3) dwellings are expected to be canvassed in this area.

Estimated Number of Dwellings (Including Industrial):	55
Number to be Canvassed:	45

Subtask 1.3 - CANVASSING SECOND PRIORITY AREAS

The goal of the field canvassing effort in second priority areas will be to locate and inventory 25% of the shallow domestic wells. To accomplish this, the assumption is made that canvassing 25% of the dwellings will result in locating at least 25% of the wells. Inventory forms will be completed for each of the residences contacted.

1.3.1 - Area West of Galena Subsite

This survey area extends from the western limits of the 1985 Galena subsite water supply inventory, west towards the banks of Shoal Creek, Empire Lake and Spring River (Figure 1). An estimated 170 dwellings are located in this area. The dwellings are distributed unevenly with many located in clusters along the shore of Shoal Creek and Empire Lake. As canvassing progresses, an attempt will be made to select the survey locations so they are distributed over the entire survey area.

Estimated Number of Dwellings:	170
Number to be Canvassed:	43

1.3.2 - Lowell Survey Area

The Lowell survey area will include Sections 29 and 30 (T34S, R25E) south of Shoal Creek and Spring River. Public water supplies are not available to this survey area, and private wells are apparently the principal water source. This area encompasses the Town of Lowell with an estimated eighty-four (84) dwellings, and about seven dwellings lying to the west of Lowell on the Spring River flood plain. Based on a total of about 90 dwellings, the canvassing effort will be directed at 25%, or 23 dwellings. To obtain a better aerial distribution of survey points, all seven dwellings that are located on the flood plain west of Lowell will be canvassed, and 16 dwellings in the Town of Lowell will be canvassed.

Estimated Number of Dwellings: 90

Number to be Canvassed: 23

Subtask 1.4 - SAMPLING SHALLOW WELLS

The shallow wells referred to under this subtask are those privately owned, domestic or industrial wells which, based on the canvassing information obtained in subtasks 1.2 and 1.3, are used for potable purposes and are screened in the shallow aquifer.

Existing information from maps, aerial surveys, and telephone conversations were used to estimate the number of wells that should be sampled, and this forms the basis for the cost estimate. Table 1 lists the wells expected to be found in each survey area. This estimate of 76 wells was based on the assumption that:

- a. In first priority survey areas, all dwellings located outside public water districts will have wells for potable water, and 10% of the dwellings within the public water districts will have wells.

- b. In second priority survey areas, 75% of the dwellings will have shallow wells for their potable water. The remaining dwellings obtain water from wells on adjacent properties.

Shallow well sampling will be conducted by a two-man sampling team working in unison with the person conducting door-to-door surveys. The sampling team will begin in the second priority areas since wells are expected to be common and easily located there. The sampling team will both inventory (complete the survey form) and sample in the second priority areas. The sampling team will then sample the wells which have been located by the surveyor in the first priority areas. The surveyor will make an effort to schedule well sampling so that residents will be at home and sampling efficiency will be maintained.

Samples will be collected from the tap closest to the well head whenever possible. The well will be purged until pH, temperature, and conductivity readings stabilize. Samples will be taken for total and dissolved metals (excluding mercury), and a standard set of water quality parameters (acidity, alkalinity, hardness, sulfate, chloride, total suspended solids, pH, temperature, and specific conductivity). Refer to Table 2 for a complete list of groundwater quality parameters for laboratory and field analysis. Mercury has been excluded from the list because it has not been found at problem concentrations during past well sampling studies. Sampling procedures, sample documentation and shipping, and analytical methods will be the same as for prior well sampling tasks on this project; and are described in the project QAPP and SOP. Samples will be analyzed by the CLP.

Sampling for radionuclides will be performed on 25 of the shallow wells. These samples will be analyzed for gross alpha, gross beta, radon, and a limited number of other radioactive elements if warranted by the gross alpha/gross beta results. An effort will be made to distribute most of the sampling

TABLE 2

Groundwater Quality Parameters
Site-Wide Water Supply Inventory

<u>Investigation Analytical Parameters*</u>	<u>Dissolved</u>	<u>Total</u>
Acidity (wq)		X
Alkalinity (wq)		X
Aluminum	X	X
Antimony	X	X
Arsenic	X	X
Barium	X	X
Beryllium	X	X
Cadmium	X	X
Calcium	X	X
Chromium	X	X
Chloride (wq)		X
Cobalt	X	X
Conductivity (Specific) (F) (wq)		X
Copper	X	X
Hardness (wq)		X
Iron	X	X
Lead	X	X
Magnesium	X	X
Manganese	X	X
Nickel	X	X
pH (F) (wq)		X
Potassium	X	X
Radionuclides (R)		X
Selenium	X	X
Silver	X	X
Sodium	X	X
Sulfate (wq)		X
Temperature (F) (wq)		X
Thallium	X	X
Total Dissolved Solids (wq)		X
Vanadium	X	X
Zinc	X	X

* - For all samples unless otherwise noted.

(wq) - Water Quality Parameter

F - Field Measurement

R - Radionuclides for selected samples only (gross alpha, gross beta, radon, and other radioactive elements if warranted by the gross alpha/gross beta results).

locations among the first priority survey areas such that the sampling will cover the areas geographically, and also be concentrated in areas of higher well density. Three to five of the samples will be taken from the second priority areas. The samples will be shipped to the EPA Montgomery, Alabama facility for analysis.

Quality Assurance (QA) sampling will include one duplicate sample, one audit sample, and one blank (deionized water) sample for every 20 well samples.

SUBTASK 1.5 SAMPLING DEEP WELLS

The deep wells referred to under this subtask are municipal and industrial wells screened in the Roubidoux Aquifer. Sampling will be performed on those wells which are routinely used, i.e., the well pumps are in-place and the well operates on a regular basis as a water supply. An estimated total of 14 deep wells will be sampled, and the sampling distribution is expected to be as follows:

<u>Water Supply or Subsite Area</u>	<u>Number of Wells To Be Sampled</u>
Galena	2
Baxter Springs	2
Riverton	1
RWD-1	2
RWD-2	1
RWD-3	1
RWD-7	1
Chemical Plant (3 Miles NE of Riverton)	2
Miscellaneous	<u>2</u>
Total	14

The deep wells will be sampled for the groundwater quality parameters listed on Table 2. Samples will be collected from access point closest to the well head, ahead of any water treatment, where practicable. Field measurement will include pH, conductivity and temperature. QA sampling will include one duplicate, one audit, and one field blank.

Five of the deep wells will be sampled for radionuclides. Radionuclide sampling will be performed for one deep well in each of the following areas: Galena, Baxter Springs, RWD-1, RWD-2, RWD-3. The samples will be shipped to the EPA Montgomery, Alabama facility for analysis.

TASK 2.0 TECHNICAL MEMORANDUM

The Water Supply Inventory Technical Memorandum will be prepared after laboratory sample analysis is complete. The memorandum will include the methods and results of both the inventory survey and the well sampling tasks. The inventory survey results will include a narrative describing the number and distribution of wells within the site, the well depths and uses, and an estimate of the number of people using the shallow groundwater. USGS maps will be reproduced at 1 inch = 2,000 feet for each survey area to illustrate well and sample locations. Survey areas and water supply district areas will be shown on smaller scale maps. Groundwater quality results will be entered into the data base files, tabulated and compared to drinking water standards. The report will include a discussion of water quality problem areas, where applicable.

The technical memorandum will include a preliminary assessment of whether "areas at risk" could be serviced by expanding the existing public water supply systems. The assessment will be based on the water supply system design and capacity information obtained from KDHE, the city water departments, and the water district managers.

TASK 3.0 ACTIVITY MANAGEMENT

This task includes coordination of the technical aspects of the water supply inventory program; communication with the SM, EPA, and project

staff; budget and schedule control; coordination of the field activities; preparation of monthly activity reports for the SM; and review of technical task reports. This task does not include project management activities related to other project tasks or activities. SRW's responsibilities will include the monitoring and documentation of field activities, chain-of-custody procedures, site safety, quality assurance and quality control during the investigation. The SM and SRW's project manager will maintain project files containing copies of correspondence, work order and contract documents, field log books, data analysis and evaluation, and other project documentation.

The starting date for the Water Supply Inventory will be April 6, assuming EPA approval of the Final Work Plan is received by March 30. The estimated time required for key project segments are as follows:

[illegible]

V. COST ESTIMATES

ATTACHMENT A

CHEROKEE COUNTY SITE
WATER SUPPLY INVENTORY FORM

SUBSITE OR SURVEY AREA: _____

W68540.00

DATE: _____ TIME: _____ SURVEYOR: _____

OWNER/USER INFORMATION

Name: _____ Township/Range _____

Address: _____ Section/Quarter _____

Phone No. (Area-Number) _____

PROPERTY DIRECTIONS

Nearest Landmark: _____

Directions from Landmark: _____

WATER SOURCE

_____ Well _____ Cistern _____ Surface Water _____ Spring

_____ Municipal Water Line (Specify District) _____

_____ Other (Specify) _____

Is the well used to supplement the municipal water: _____

How often? _____

WATER USE

No. of Persons Using the Water Source: _____ Total Persons

_____ Infants (<1 yr.) _____ Adults (19-65 yrs.)

_____ Children (1-18 yrs.) _____ Adults (>65 yrs.)

Water Uses (Indicate the Water Source for Each Use):

_____ Drinking _____ Bathing _____ Washing

_____ Watering Lawn _____ Watering Garden _____ Livestock

_____ Industrial _____ Other _____ Back-up Water Supply

WATER QUALITY

pH _____ Conductivity _____ Temperature _____

Sample Location _____

DRILLING INFORMATION

Year Well Drilled: _____ Well Depth: _____
Property Owner at Time of Drilling: _____
Drilling Method: _____ Rotary _____ Auger _____ Cable Tool
_____ Hand Dug _____ Other (_____)
Depth where Water was Encountered During Drilling: _____
Distance from Well to Septic Tank/Leach Field: _____
Drilling Company: _____

WELL WATER SYSTEM CONSTRUCTION

Well Screen Depth: _____ Grouting Depth: _____
Could Surface Runoff Enter the Well: _____
Pump Capacity: _____ Pump Depth: _____ Holding Tank Size: _____
Household Piping Material: _____ Copper _____ Lead _____ PVC
_____ Other _____
Well Casing Material: _____

TREATMENT SYSTEM

Point of Use _____ Whole House _____
Treatment Includes: _____ Filter (Type) _____
_____ Softener
_____ Other Chemical _____
_____ Other Physical _____

Brand Names of Treatment System of Components:

Water Quality Compliant: _____

Water Level or Quantity Problems: _____

Willingness to Allow Sampling: _____

Comments: _____

Surveyor's Signature _____ Date _____